

WHAT IS CLAIMED IS:

1. A switching power supply circuit having a switching element for controlling on/off state of an input power supply according to a drive pulse generated on the basis of a clock pulse having a prescribed period, wherein an electric current is allowed to flow from the input power supply to a load by controlling the switching element to be in on state, and a flywheel current is allowed to flow to the load by controlling the switching element to be in off state; the switching power supply circuit comprising:

overcurrent detecting means for detecting that the current flowing through the switching element has reached a first reference value;

flywheel current detecting means for detecting that the flywheel current has reached a second reference value; and

an overcurrent protection circuit for performing an overcurrent protection operation of turning the switching element off based on a detected output of the overcurrent detecting means, and for turning the switching element on during the overcurrent protection operation at a timing of the clock pulse after the flywheel current detected by the flywheel current detecting means has reached the second reference value.

2. The switching power supply circuit according to claim 1, wherein the flywheel current detecting means detects the flywheel current based on an output of a current detection resistor provided in a flywheel current path.

3. The switching power supply circuit according to claim 1, wherein the flywheel current detecting means comprises a second switching element provided in the flywheel current path and being turned on and off in synchronism with the first-mentioned switching element, and detects the flywheel current using a resistance of the second switching element in on state.

4. The switching power supply circuit according to claim 1, wherein the flywheel current detecting means further comprises a third switching element provided in the flywheel current path and constitutes a current mirror together with the second switching element that is turned on and off in synchronism with the first-mentioned switching element,

whereby the flywheel current detecting mean detects the flywheel current based on the current flowing through the third switching element.

5. The switching power supply circuit according to claim 1, wherein the second reference value is set to a value of zero or above.

6. A switching power supply circuit comprising:

- a switching element provided with a source terminal, a drain terminal and a gate terminal;
- a power supply source connected to the source terminal;
- a load connected to the drain terminal;
- a control circuit connected to the gate terminal;
- an inductor disposed in a current path from the drain terminal to the load;
- a first current detection resistor disposed in a current path from the source terminal to the load;
- a first comparator connected to the first current detection resistor;
- a second current detection resistor disposed in a current path from the drain terminal to the ground terminal; and
- a second comparator connected to the second current detection resistor.

7. The switching power supply circuit according to claim 6, wherein the second comparator uses a ground potential or positive potential as a reference.

8. An overcurrent protection method for a switching power supply circuit having a switching element for controlling on/off state of an input power supply according to a drive pulse generated on the basis of a clock pulse having a prescribed period, wherein

an electric current is allowed to flow from the input power supply to a load by controlling the switching element to be in on state, and a flywheel current is allowed to flow to the load by controlling the switching element to be in off state; the overcurrent protection method comprising:

detecting that the current flowing through the switching element has reached a first reference value;

detecting with an overcurrent detecting means that the current flowing through the switching element has reached a first reference value;

detecting with flywheel current detecting means that the flywheel current has reached a second reference value;

performing an overcurrent protection operation for turning off the switching element based on a detected output of the overcurrent detecting means; and

turning on the switching element during the overcurrent protection operation at a timing of the clock pulse after the flywheel current detected by the flywheel current detecting means has reached the second reference value.